2. PHONEMES

There are twenty-three segmental phonemes in Kimaragang: eighteen consonants /p t k ʔ b d g ɓ ɗ s ʤ m n ŋ l r w y/ and five vowels /i u e o a/. Stress is noncontrastive.

[1]Supplementary data was collected during subsequent visits to Tingkalanon.

	Bilabial	Alveolar	Palato-alveolar	Palatal	Velar	Glottal
Vl. plosive	p	t			k	ʔ
Vd. plosive	b	d			g	
Implosives	ɓ	ɗ				
Fricative		s				
Affricate			ʤ			
Nasal	m	n			ŋ	
Lateral		l				
Flap		r				
Semivowel	w			y		

	Front	Central	Back
High	i		u
Mid	e		o
Low		a	

2.1 Description of phonemes

2.1.1 Consonants

Most consonants exhibit relatively little allophonic variation. All plosives are unreleased in word-final position.

The voiceless plosives /t/ and /k/ are articulated at slightly different positions from their voiced counterparts, /d/ and /g/. The /t/ is fronted to dental or, more frequently, inter-dental position. The /d/, on the other hand, is pronounced with alveolar articulation. The voiceless velar /k/ is noticeably farther back than the voiced /g/, especially in word-final position when it often sounds like a uvular plosive. A similar situation regarding the articulation of /t/ and /k/ is reported in other Sabah languages, e.g., Kalabuan and Ida'an.

The implosives /ɓ/ and /ɗ/ occur only in word-initial or intervocalic position, and the voiced plosives /b/ and /d/ are very rare in these positions. However, the glottalization is contrastive (e.g. /monuduŋ/ 'look down', vs. /monuɗuŋ/ 'chop wood'). A very similar situation is reported in Coastal Kadazan (cf. Miller this volume; cf. also Blust 1973).

The Kimaragang describe the contrast as a difference between "voiced" (**oni**) /d/ and /b/, and "voiceless" (**amu oni**) /ɗ/ and /ɓ/. One of the characteristic differences between the Tandek and Pitas dialects is that in the latter there are no implosives. They have been replaced by (merged with) voiced plosives.

In Kimaragang, as in Coastal Kadazan, the glottalized implosives are the norm. Word-initial or intervocalic /b/ and /d/ occur primarily in Malay loan words. To date, only a handful of indigenous Dusunic words have been found with intervocalic /d/, and intervocalic /b/ seems even rarer in Dusunic roots. However, a fair number of Malay loan

words are now pronounced with implosives, e.g., /ɓadʒu/, /ɓaŋku/, /ɓisara/, /ɓiɗa/ (from Malay **beza**), and /kaɗay/.

Most Kimaragang speakers who are bilingual in Malay use plain voiced plosives in all environments when speaking Malay. When vocabulary items are elicited in isolation in Malay, as when taking a word list, some speakers unconsciously use Malay-type (non-glottalized) plosives in Kimaragang words. If the same terms are elicited in Kimaragang, the normal pattern of glottalization reappears. Needless to say, this can be a source of considerable confusion.

Some speakers recognize the following minimal pair: [ɓawaŋ] 'river' vs. [bawaŋ] 'onion' (the latter probably a Malay loan word). For other speakers, these two words are homophones, [ɓawaŋ].

The glottal plosive is contrastive word-finally. The contrast between final glottal and final open vowels is very productive in the Pitas dialect, but much less so in the Tandek dialect which we are describing here. Word-final open syllables (i.e., final vowels not followed by glottal) are relatively rare in this dialect. All examples of final (open) vowels identified so far are in functors, pronouns, question words, etc. (though many other words in these categories do have the final glottal). Like the glottalization of implosives, the final glottal carries a very small functional load. Only two minimal pairs have been found to date: /ko/ 'you (sg.)' vs. /koʔ/ 'or'; and /toŋo/ 'what?' vs. /toŋoʔ/ '(plural)'. In connected speech, the final glottal tends to drop out except at phrase boundaries or before pauses (e.g., when the speaker is searching for a word).

It is not yet entirely clear whether the intervocalic glottal plosive should be regarded as phonemic or not. The glottal occurs almost exclusively between the penultimate and ultimate syllables. In this position it may occur (optionally if not obligatorily) between halves of any geminate vowel cluster, and between any two contiguous nonhigh vowels. The only known counter-examples to this rule are the particles /ooʔ/ 'yes', and /aaʔ/ 'not'; no glottal may be inserted between vowels in these words.

The glottal is very rare in pre-root position, but note the following minimal pair: /mokiintoŋ/ 'want to see', vs. /mokiʔintoŋ/ 'ask for divination'. (These two forms are apparently identical in morphemic shape; the reason for the phonological distinction is not clear.) A few other forms are found with a glottal between prefix and root, e.g., [miʔiɾakˀ] 'laugh together' (contrast [miiɾadˀ] 'same').

In cases where the glottal separates the final two vowels (or syllables) in a word, the glottal is obligatory when the stress falls on the final syllable, as in [ɑɾaˈʔaţˀ] 'bad' and [ɾapaˈʔʏŋ] 'cook by steaming'. The glottal is optional where the stress is penultimate (i.e., on the first vowel in the sequence), e.g. [ˈɾa:ţˀ] ~ [ˈɾaʔaţˀ] 'sea'.

Where the glottal is optional, my subjective impression is that it is more frequently pronounced in the Kimaragang-Garo dialect than in Tingkalanon; more frequently pronounced by women than men, and by older people than by the young. Some older people insist on the glottal as the "correct" pronunciation.

I will provisionally treat the intervocalic glottal plosive as phonemic wherever it occurs, optionally or obligatorily. It is very unlikely that stress is contrastive on the

word level in Kimaragang (cf. sec. 4). Assuming stress to be predictable on other grounds, stress placement will determine the environments where the glottal is phonetically optional.

/p/ [p̚] voiceless unreleased bilabial plosive; occurs word-finally:
/ta?ap/ [ta?ap̚] 'roof'

[p] voiceless bilabial plosive; occurs elsewhere:
/puralan/ [puralaŋ] 'lines in palm of hand'
/timpak/ [tɪmpak̚] 'stack up'

/t/ [t̚] voiceless unreleased dental plosive; occurs word-finally:
/kawut/ [kawut̚] 'cloud'

[t] voiceless dental plosive; occurs elsewhere:
/tulun/ [tuluŋ] 'person'
/punti?/ [puŋti?] 'banana'

/k/ [k̚] voiceless unreleased back velar plosive; occurs word-finally:
/tokobuk/ [tʏkʏɓuk̚] 'hair'

[k] voiceless back velar plosive; occurs elsewhere:
/kudow/ [kudʏᵘ] 'eyebrow'
/taŋkap/ [taŋkap̚] 'sheath'

/ʔ/ [ʔ] glottal plosive; not contrastive word-initially:
/tama?/ [tama?] 'father'
/ala?ab/ [ala?ab] 'wide'

/b/ [b̚] voiced unreleased bilabial plosive; occurs word-finally:
/kaŋkab/ [kaŋkab̚] 'shoulder'

[b] voiced bilabial plosive; occurs elsewhere:
/tobpinee?/ [təbpine:?] 'sibling'
/siombo/ [siʏmbʏʰ] 'where'
/bu?uk/ [bu:k̚] ~ [bu?uk̚] 'book'

/d/ [d̚] voiced unreleased alveolar plosive; occurs word-finally:
/tagad/ [tagad̚] 'field'

[d] voiced alveolar plosive; occurs elsewhere:
/tadaw/ [tadaᵘ] 'day'
/toŋondu?/ [tʏŋʏnduʔ] 'woman'

/g/ [g̚] voiced unreleased velar plosive; occurs word-finally:
/ɓayag/ [ɓayag̚] 'sweet potato'

[g] voiced velar plosive; occurs elsewhere:
/giɓaŋ/ [giɓaŋ] 'left (hand)'

/ɓ/ [ɓ] voiced bilabial implosive:
/raɓas/ [raɓas] 'forehead'
/ɓawaŋ/ [ɓawaŋ] 'river'

/ɗ/ [ɗ] voiced alveolar implosive:

/ɗarun/	[ɗarun̪]	'rain'
/saɗa?/	[saɗa?]	'fish'

/s/ [s] voiceless alveolar central fricative; alternates with [ʃ] voiceless palato-alveolar central laminal fricative before high vowels:

/tasu?/	[t̪asu?] ~ [t̪aʃu?]	'dog'
/tusiŋ/	[t̪usiŋ] ~ [t̪uʃiŋ]	'cat'
/isay/	[isaⁱ]	'who'
/siombo/	[siɤmbɤʰ]	'where'

/dʒ/ [dʒ] voiced palato-alveolar affricate:

/adʒaŋ/	[adʒaŋ]	'stop by'
/kumaradʒa?/	[k̲umaradʒa?]	'work'

The voiced affricate is very common in personal names and loan words, but occurs only rarely in native Dusunic words. A voiceless affricate /tʃ/ is used in a few names, e.g. **Bainci** [ɓɛntʃi?], but is not included here as a full phoneme of the language.

/m/ [m] voiced bilabial nasal:

/mogom/	[mɤgɤm]	'sit'
/tombolog/	[t̪ɤmbɤlɤg̚]	'bird'

/n/ [ⁿd] voiced alveolar prenasalized plosive; occurs before /r/:

/sanrawo?/	[saⁿdrawɤ?]	'one ear (of rice)'

[n̪] voiced dental nasal; occurs elsewhere:

/wanan/	[wan̪an̪]	'right (hand)'
/indakod/	[n̪dak̲ɤd̚]	'climb up'

The phonetic cluster [ⁿdr] is interpreted phonemically as /nr/ because no other triple consonant cluster is found in the language, and also because native speaker intuition is quite strong in favour of this interpretation.

/ŋ/ [ŋ] voiced velar nasal:

/ŋaran/	[ŋaran]	'name'
/tiŋgaton/	[t̪iŋgat̪ɤn]	'betel nut'
/kaɓaŋ/	[k̲aɓaŋ]	'mouth'

/l/ [l] voiced alveolar lateral:

/limo?/	[limɤ?]	'five'
/ralan/	[ralan̪]	'trail'
/oboŋol/	[ɤbɤŋɤl]	'naughty'

/r/ [r] voiced alveolar trill; occurs word-finally:

/monombir/	[mɤŋɤmbir]	'to sew'

[ɾ] voiced alveolar flap; occurs elsewhere:

/karabaw/	[k̲arəɓaᵘ]	'buffalo'
/paray/	[paraⁱ]	'padi'
/raɓas/	[raɓas]	'forehead'

I noticed two speakers in Kg. Salimandut pronounce the /r/ as a velar fricative, [ɣ], in all environments. This feature is characteristic of the deep Sonsogon dialect, e.g., Kg. Sonsogon Magandai, but both of the men just refered to were born in Salimandut of Kimaragang-Garo parents. Among the Tandek Kimaragang, this trait is considered a speech defect, and is called /ɓira?/.

/w/	[w]	voiced rounded labiovelar semivowel:		
		/walu?/	[walu?]	'eight'
		/tawan/	[tawaŋ]	'sky'
		/mamanaw/	[mamaŋa^{u}]	'walk'
/y/	[y]	voiced unrounded palatal semivowel:		
		/ɓayag/	[ɓayag̃]	'sweet potato'
		/minatay/	[miŋaṭa^{i}]	'died'

2.1.2 Vowels

There seem to be three possible ways of describing the vowel system of Kimaragang: 1) as a 4-vowel system /i a o u/, corresponding to the historical Dusunic system; 2) as a 4-vowel system with an archiphoneme /E/ representing the neutralization of /a/ and /o/ in the sequence /Ei/ (realized phonetically as [e:] ~ [e?e]); 3) as a 5-vowel system, with /e/ analyzed as a full phoneme having limited distribution.

The sequence /o+i/ across morpheme (or clitic) boundaries is realized by the portmanteau phone [e] (cf. sec. 5.1). A similar process applies to the sequence /i+o/ in some words, e.g., /mi+obpinee?/ → [mɛbpine:?] 'related as siblings' (in Kimaragang-Garo dialect). But this does not seem to be uniform for all speakers or for all forms in which the sequence /i+o/ appears. For the rest of this section, the cases of [e] arising from /i+o/ will be ignored.

Besides the [e] arising from merger across morpheme boundaries, there are a number of root forms containing the phone [e]. Usually, the [e] is part of a long vocoid or geminate cluster, as in [we:g] ~ [we?eg] 'water', and [məle?eŋ] 'parents'. There are a few roots, however, which contain a single short vocoid [e], e.g., [sera?] 'when', and [separ] 'broadbill species'.

Comparative evidence indicates that the [e?e] in Kimaragang is derived historically from the sequences *o?i and *a?i (after the merger of *h, attested in Sonsogon and Rungus, with *?). A parallel process has caused the merger of *o?u and *a?u to [o?o] or [o:] in modern Kimaragang.

The vocoid sequences [a(?)i] and [ɤ(?)i] do not occur in Kimaragang, although in word final position the sequences /-ay/ [-a^{i}] and /-oy/ [-ɤ^{i}] are quite common. This gap in the distribution pattern makes it tempting to analyze [e:] ~ [e?e] as the realization of the phonemic sequences /o(?)i/ and /a(?)i/. This 4-vowel analysis would involve a rule of bi-directional partial fusion, or mutual assimilation, which parallels the historical process:

{/o?i/, /a?i/}	→	[e:] ~ [e?e]
{/oi/, /ai/}	→	[e]

The most serious problem with the four-vowel analysis is that there is no internal way of determining the underlying vowel sequences for forms such as [we:g] 'water' and [əpe:t] 'bitter'. One would be forced either to use comparative evidence to determine the historical form of such words, and take that as the phonemic form; or to represent all occurrences of [e:] ~ [e?e] or [e] arbitrarily in the same way, e.g. as /a(?)i/, leaving the non-occurrence of /o(?)i/ as an unexplained gap in the distribution.

Another problem with this analysis is that the medial glottal would not otherwise occur between non-geminate vowel sequences where one of the vowels is high. But without positing a phonemic glottal plosive in the underlying forms /a?i/ and /o?i/, there would be no way to account for the difference in length between [e] in [sera?] 'when' and [e:] in [əle:d] 'long time'.

A third objection is that analyzing forms like [separ] as /saipar/ or /soipar/ would introduce a new root pattern. Roots containing three vowels are very rare.

The four-vowel solution amounts to allowing the absolute neutralization of two sequences, /o(?)i/ and /a(?)i/, neither of which ever occurs in the surface phonetic realization. In the present work I will opt for a less abstact solution.

An analysis involving an archiphoneme /E/ preserves the underlying four-vowel system, while explicitly recognizing the neutralization of /a(?)i/ and /o(?)i/. Again, a rule of bidirectional partial fusion would change both the archiphoneme and the following /i/ to [e]:

/E?i/	→	[e:] ~ [e?e]
/Ei/	→	[e]

This solution accounts for the vocoid [e:] and the sequence [e?e] in root forms, as well as the non-occurrence of the vowel sequences /o(?)i/ and /a(?)i/. However, as in the four-vowel solution, the phonemic shape of root forms containing a short [e] remains anomalous. No other roots have been found with non-geminate vowel clusters in non-final position.

The analysis adopted here is that /e/ is a full phoneme of the language, although more restricted in its distribution than the other four vowels. Thus [e] is identified with /e/ in all environments, and the phonemic shape of most syllable nuclei is virtually identical to the phonetic realization. In a classical phonemic analysis, the merger of /o+i/ to /e/ across morpheme boundaries must be treated as a morphophonemic process, though in other frameworks which do not require strict "bi-uniqueness", it could be considered simply phonetic (or allophonic).

Historical change has led to surface contrasts which distort the symmetry of the underlying four-vowel Dusunic system. This is a good example of a "fuzzy area" in the synchronic system which can be explained in terms of diachronic processes (Vachek 1964). Similar changes seem to be in process in some closely related Dusunic languages.

Forschner (1978) describes /e/ in Rungus as a full phoneme, but states that it occurs "only as [the] contraction of a+i or o+i", i.e., as the result of morphophonemic processes. No Rungus root forms contain /e/.

Lees (1964) reports that the vocoid [e] in Ranau (Central) Dusun "occurs word medially, usually at morpheme boundaries. It quite frequently varies to -oi-. Since -oi only occurs in final position in the word, and e varying to -oi- occurs in medial positions only, they can be regarded as variants of the same phonemes."

In Kimaragang, the process */ai/ → /ee/ appears to be productive in loan words such as /miseen/ 'to affix thumb-print' (from English **sign**), and /eran/ 'surprised' (from Malay **hairan**). However, borrowings are also reintroducing the sequence /ai/ in contrast to /ee/, as in the words /monaip/ 'to type' and /moneep/ 'to record' (from English **tape**).

As mentioned in section 2.1.1 above, word-final open vowels are relatively rare, occurring in far fewer forms than either the final glottal or final semivowels. When a nonhigh back vowel (/a/ or /o/) occurs in a final open syllable, it is followed by a slight breathiness or aspiration. In some forms, this breathiness is retrogressive, affecting earlier segments of the word as well. For example, in the word /ko/ 'you (sg.)', the initial plosive is pronounced as a lenis aspirated plosive or even a velar fricative: [k̲ʰɤʰ] ~ [xɤʰ] (contrast the fortis unaspirated plosive in /ko?/ [k̲ɤ?] (particle)).

In pre-stress position, and particularly in prefixes, the nonhigh vowels /a/ and /o/ tend to reduce to schwa in normal speech. The exception to this rule is that /a/ remains [a] before the velar consonants, /k g ŋ/. This neutralization represents a case of complete overlap, i.e., two phonemes sharing the same allophone in the same environment, and thus threatens the bi-uniqueness of the phonemic representation. However, native speakers always know which vowel occurs in which word, and in slow or emphatic speech the contrast reappears. In prefixes, the identity of a nonhigh vowel is also predictable from the rules of vowel harmony (cf. sec. 5).

/i/ [ɪ] semi-high front unrounded vowel; alternates with [i] in closed syllables:
/insan/ [ɪn̥saŋ̥] 'once'

[i] high front unrounded vowel; occurs elsewhere:
/inan/ [in̥aŋ̥] 'aunt'

/u/ [ʊ] semi-high back rounded vowel; alternates with [u] in closed syllables:
/tumulud/ [t̥umulʊd̚] 'to fly'

[u] high back rounded vowel; occurs elsewhere:
/sumundak/ [sumʊn̥dak̚] 'adolescent female'

/e/ [ɛ] lower-mid front unrounded vowel; alternates with [e] in closed syllables:
/mebpinee?/ [mɛbpine:?] 'related as siblings'

[e] mid front unrounded vowel; occurs elsewhere:
/ela?an/ [ela?aŋ̥] 'know'

/o/ [ə] mid central unrounded vowel; alternates with [ɤ] in prestressed syllables:
/nopoŋo?/ [n̥əpɤŋɤ?] 'completed'

[ɤ] mid back unrounded or slightly rounded vowel; occurs elsewhere:
/lopoŋ/ [lɤpɤŋ] 'python'

/a/ [ə] mid central unrounded vowel; alternates with [a] in prestressed syllables, except before velars:
/katalib/ [k̲ə̤talib̰] 'after'

[a] low central unrounded vowel; occurs elsewhere:
/maŋakan/ [maŋak̲an̲] 'eat'

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Bonggi
Ida'an
Kadazan/Dusun
Kalabuan
Kimaragang
Labuk-Kinabatangan Kadazan
Lotud
Tagal
Tatana'
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